A PREVIOUSLY UNRECOGNIZED SPECIES OF SENEGALIA (FABACEAE) FROM NORTHEASTERN BRAZIL

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ABSTRACT

During the course of our work on the genus Senegalia Raf. of Brazil, we encountered a collection [M. Blanchet 2772 (F, GH, K)] that Bentham (1842) cited first under Acacia velutina DC. and subsequently (1875, 1876) as Acacia monacantha Willd. Until now this collection has mostly been accepted under the latter name. However, as more specimens have become available, it is clear that they represent a hitherto undescribed species that is distinct from both Senegalia monacantha (Willd.) Seigler & Ebinger (syn. Acacia monacantha) and Senegalia velutina (DC.) Seigler & Ebinger (Acacia velutina). It is here described and illustrated as Senegalia paganuccii Seigler, Ebinger, & Ribeiro and compared to its probable nearest relative Senegalia tenuifolia (L.) Britton & Rose. The new species is endemic in Brazil where it occurs in the states of Bahia, Minas Gerais, and Piauí, Brazíl.

RESUMEN

En el progreso de nuestro estudio sobre el género Senegalia de Brasil se encontró que unos ejemplares M. Blanchet 2772 (F, GH, K) que fueron citados por Bentham como Acacia velutina DC. (1842) (Senegalia velutina (DC.) Seigler & Ebinger) y después (1875, 1876) como Acacia monacantha Willd. (Senegalia monacantha (Willd.) Seigler & Ebinger). Aunque la mayoría de los materiales han sido aceptados como tal, no obstante con una mayor disponibilidad de colecciones se puede clarificar que las características de estos materiales son distintas y que corresponden a una nueva especie. Ejemplares de este taxon obtenidos en los estados de Bahía, Minas Gerais y Piaui, Brasil, se describen aquí como Senegalia paganuccii Seigler, Ebinger, & Ribeiro, y son comparados con la especie más afín Senegalia tenuifolia (L) Britton & Rose.

During the course of our work on the genus Senegalia Raf. of Brazil, we encountered a collection [M. Blanchet 2772 (F, GH, K)] that Bentham (1842) cited first as Acacia velutina DC. and subsequently (1875, 1876) as Acacia monacantha Willd. This material had mostly have been accepted under the latter name, but as more collections have become available, it is clear that they represent a previously undescribed species distinct from both Senegalia monacantha (Willd.) Seigler & Ebinger (syn. Acacia monacantha) and Senegalia velutina (DC.) Seigler & Ebinger (syn. Acacia velutina).

Senegalia paganuccii Seigler, Ebinger, & Ribeiro, sp. nov. (Fig. 1). Type: BRAZIL. BAHIA: Municipio Rio de Contas, 10 km do Rio de Contas na estrada para Marcolino Moura, Caatinga (13º36S, 41º43W, elev. 500-600 m), 15 Nov 1988, gemmae (buds, gem.) & flowers (fl.), R.M. Harley, D.J.N. Hind & T.B. Cavalcanti 26439 (HOLOTYPE: HUEFS; ISOTYPES: CEPEC, CTES, F, K, NY, SP, SPF).

Shrub or small tree to 6 m tall, ramified from the base; bark grayish; twigs reddish brown to dark purple, not flexuous, terete, usually puberulent; short shoots absent; prickles brown to purple-brown, apex usually darker, flattened, recurved, woody, 1-3 mm long, 1-3 mm at the base, glabrous, scattered along the twig, petiole and rachis, commonly paired at some nodes; perulate buds commonly presently at leaf axil, ovate or elliptic in profile, 5-7 x 2-4 mm. Leaves alternate, commonly paired at some nodes, 30-100 mm long; stipules light to dark brown, lanceolate, symmetrical, flattened, straight, herbaceous, 4-10 x 1.5-5.5 mm, pubescent and ciliate, early deciduous; petiole slightly grooved adaxially, 6-19 mm long, pubescent; petiolar gland solitary, usually located just below the lowest pinna pair, sessile, attached near the middle, the margins of the petiolar gland turning upward, oval to orbicular, 0.6-1.5 mm across, cup-shaped, glabrous; rachis adaxially grooved, 25-80 mm long, pubescent, an oval gland 0.4–0.9 mm across between the upper and sometimes other pinna pairs, rachis glands 0.4-0.8 mm across, oval, cup-shaped, glabrous; pinnae 4 to 11 pairs per leaf, 25-45 mm long, 4-10 mm apart; paraphyllidia 0.3-0.7 mm long, mostly absent; petiolule 0.8-1.5 mm long; leaflets 25 to 40 pairs per pinna, opposite, 0.7-1.1 mm apart, linear, 4-6 x 0.9-1.4 mm, glabrous, lateral veins not obvious, 1

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Fig. 1. Senegalia paganuccii Seigler, Ebinger, & Ribeiro. A. Flowering branch. B. Petiolar gland. C. Leaflet upper surface. D. Inflorescence. E. Flower bud. F. Flower at anthesis. G. Gynoecium showing detail of ovary. H. Prickles. I. Vegetative bud detail. J. Fruit. K. Detail of inner surface of the fruit showing the seed. L. Fruit, detail of surface showing the glands and hairs. M. Bud. Drawn by P.G. Ribeiro. A–B, D–G, M from L.P.Queiroz et al. 7931 (HUEFS); C. H–I from R.M. Harley et al. 26439 (HUEFS); J–L from A.A. Conceição et al. 1925 (HUEFS).

vein from the base, base oblique and truncate on one side, margins ciliate, apex obtuse, midvein submarginal. **Inflorescence** a densely 40–75-flowered cylindrical spike, $9-15 \times 20-45$ mm, 1 to 3 in the leaf axils; peduncles 6–22 long, 0.4–0.6 mm thick, pubescent; receptacle not enlarged; involucre absent; floral bracts spatulate.

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0.9–1.4 mm long, puberulent, early deciduous. **Flowers** sessile, white to cream-colored; calyx 5-lobed, 1.2–1.9 mm long, glabrous; corolla 5-lobed, 2.0–2.7 mm long, glabrous, lobes one-quarter the length of the corolla; stamens 45–84, filaments 4.5–6.5 mm long, distinct; anther glands absent; ovary pubescent, on a stipe to 1.1 mm long. **Legumes** oblong, 60–110 × 17–27 mm, straight, flat, not constricted between the seeds, coriaceous, transversely striate, puberulent, numerous minute purple glands present, dehiscent along both sutures; stipe 8–15 mm long; apex acute, short-beaked. **Seeds** uniseriate, $6.5-8.5 \times 3.8-5.5$ mm, orbicular, flattened, smooth, no pulp, dark brown; pleurogram U-shaped, 1.4–2.4 mm across; funicle exarillate.

Distribution and ecology.—Tropical deciduous forests, savannas, caatingas, and disturbed sites from sea level to 1000 m in eastern Brazil in the states of Bahia, Minas Gerais, and Piauí.

Phenology.—Flowering May–July, September–December; Fruit January–June, August–December. Local Names.—espinheiro-preto (Minas Gerais), jurema-branca (Bahia), jurema-preta (Bahia), jurema (Bahia).

Conservation Status.—Restricted to the states of Bahia, Minas Gerais, and Piauí, Brazil, this species appears to be relatively common in that region with a number of recent collections seen.

Etymology.—We have named this species after Dr. Luciano Paganucci de Queiroz, Universidade Estadual de Feira de Santana, Brazil, a student of the legumes, especially those of the caatinga and more generally of Northeastern Brazil.

Specimens examined: BRAZIL. BAHIA: Abaira: estrada Piatā-Abaira, acima da entrada do Andrequisé, carrasco seco com solo argiloso, 13°17 S, 43°08 W, 900 m, 22 Sep 1992 (gem., fl.), W. Ganev 1168 (HUEFS, K, NY, SPF). Barra: médio São Francisco, Barra Pau d'arco Lagoa do Canto, caatinga, 11º05 S, 41º42 W, 17 Nov 2007 (fr.), M.L. Guedes et al., 14499 (ALCB). Bom Jesus da Lapa: estrada para Ibotirama, caatinga, 11 Apr 2002 (fr.), J.G. Carvalho-Sobrinho et al. 505 (HUEFS); Basin of the Upper Sao Francisco River, just beyond Calderão, ca 32 km NE from Bom Jesus da Lapa, caatinga with damp sand área, 13°10 S, 43°13 51 W, ca. 500 m, 18 Apr 1980 (fr.), R.M. Harley 21520 (CEPEC, NY, RB). Caem: 2 km E de Vila Cardoso, na estrada Capim Grosso-Juazeiro, caatinga, 11º7 58 S, 40º3 41 W, 410 m, 24 Nov 2003 (gem., fl.), L.P. Queiroz et al. 7931 (CEN, HUEFS); same location, 7932 (CEN, HUEFS). Campo Alegre de Lourdes: mata na estrada para a Pitomba, mata, 9°29 4 S, 43°5 20 W, 510 m, 14 Jun 2001 (fr.), T.S. Nunes et al. 390 (CEPEC, HUEFS, HRB). Caturama: Caieiras, caatinga arbórea, 13°17 27 S, 42°13 32 W, 634 m, 5 Sep 2007 (fr.), A.A.Conceição et al, 2390 (HUEFS). Ibipeba: Barragem de Mirorós, caatinga densa, 11°30 S, 42°12 W, 25 Mar 1991 (fr.), P.E. Nogueira 228 (IBGE). Irecê: Barra do Mendes, caminho para Ipupiara, mata ciliar, 11º49 39 S, 42º08 12 W, 25 Oct 2009 (fr.), M.L.Guedes el al. 16112 (ALCB). Jacobina: ca. 10 km na estrada de Jacobina para Morro do Chapéu, campos rupestres, 14 Mar 1990 (fr.), A.M. Carvalho & J. Saunders 2798 (CEPEC, K, RB, TEX). Maracás: entrada da Boca do Mato, 791 m, 19 Dec 2004, M.M. da Silva-Castro, I.F. Castro, R.F. Brito, J.H. Falcão, & C.R.A. Costa 953 (HUEFS). Marcionílio Souza: s.loc., caatinga arbórea, Jul 1980, G.C.P. Pinto 203 (HRB, IPA, MBM). Morpará: estrada para Morpará, beira do rio Paramirim, caatinga verde, 11º43 50 S, 43º13 39W, 396 m, 15 Dec 2007 (fl.), A.A.Conceição el al. 2640 (HUEFS); Morro da Antena, caatinga sobre solo pedrogoso, 11º33 25 S, 43º16 40 W, 17 Dec 2007 (fl., fr.), A.A. Conceição et al. 2722 (HUEFS). Palmeiras: s.loc., 3 Oct 2003 (fl.), A. Bocage et al. 871, 878 (IPA, UFRGS); same location, 4 Oct 2003 (fl.), A. Bocage et al. 881, 882, 883 (IPA, UFRGS), 887 (IPA, JPB, UFRGS). Paramirim: caminho Catuarama para Mateus, caatinga, 13º17 50 S, 42º14 44 W, 593 m, 28 Apr 2007 (fr.), A.A.Conceição et al. 1925 (ALCB, HUEFS). Pilão Arcado: caminho para Brejo do Zacarias (Brejinho), 9 Dec 2005, A.A. Conceição et al. 1548 (HUEFS); same location, vegetação dunas, 10º0 9 S, 42º30 35 W, 10 Nov 2005 (gem., fl.), A.A. Conceição et al. 1586 (HUEFS). Pindai: rodovia BR-122, 10 km S de Pindai, carrascal, 800 m), 2 Jul 2004 (gem., fl.), G. Hatschbach et al. 78761 (MBM). Remanso: saída de Remanso a Pilão Arcado, 9º44 17 S, 42º23 49 W, 28 Feb 2000 (fr.), L. Passos et al. 393 (ALCB, CEN, HUEFS, HRB, RB, SPF); estrada para Pilão Arcado, entrada à direita, ca. de 29 km da cidade, caatinga em solo arenoso, 9°45 18 S, 42°18 10 W, 414 m, 16 Jun 2001 (fr.), T.S. Nunes, et al. (ALCB, CEPEC, HRB, HUEFS). Rio de Contas: estrada para Jussiape, caatinga, em solo arenoso, pedregoso. 13º32 S, 41º52 W, 7 Sep 2003 (gem., fl., fr.), R.M. Harley & A.M. Giutietti 54686 (HUEFS). Seabra: Distrito de Bebedouro, 12 km a partir do ramal que leva ao distrito, caatinga arbustiva, 27 Jan 1998 (fr.), A.M. Amorim et al. 2186 (CEPEC, SP); 3 km S de Logoa do Chure no estrada para SEABRA, 1000 m, 22 Jun 1993, L.P. de Queiroz & N.S. Nascimento 3370 (HUEFS). Sebastião Laranjeiras: Serra do Monte Alto, contato savana/caatinga/ floresta estacional, 14º32 15 S, 42º54 34 W, 850 m, 7 May 2009 (fr.), S. Sousa Silva et al. 535 (HRB, IBGE, VIC). Sento Sé: subida do Morro, 9°51 15 S, 42°3 11 W, 420 m, 13 Nov 2007 (fr.), C. Correia et al. 324 (HUEFS); same municipality, 9°51 44 S, 42°2 40 W, 495 m, 14 Nov 2007 (gem., fl.), C. Correia et al. 336 (HUEFS). Souto Soares: 3 km N de Souto Soares, camino a Mulungu do Morro, caatinga arbórea, ca. 12º03 S, 41°38 W, ca. 750 m, 26 Nov 1992 (fl.), M.M. Arbo, et al. 5317 (GH, HUEFS, K, MO, NY, SP, SPF). Umburanas: Distrito de Delfino, Fazenda Boa Esperança, caatinga, encosta e vale do rio dos Morins, afluente do rio Salitre, 10°30 19 S 41°19 51 W, 750 m, 24 May 2008 (fr.), E. Melo et al. 5736 (HUEFS). Utinga, M.Blanchet 3772 (K, MO); Próximo a Butirama, caatinga, 10°33 S 43°38 W, 6 Apr 1978 (fr.), J.S. Assis 138 (HRB, RB); km 50, entre Tremendal e Piripá, 620 m), 15 Oct 1970 (fl.), D. Andrade-Lima 6056 (IPA). Without municipality: Río San Francisco, 1838, M.Blanchet 2772 (F, GH, IT, K). MINAS GERAIS: 13 km by road W of Januaria on road to Serra das Araras, 575 m, 19 Apr 1973, W.R. Anderson 9162 (CM, MO, NY); 13 km by road W of Januaria on road to Serra das Araras, 575 m, 19 Apr 1973, W.R. Anderson 9163 (NY); approx. 10 km W of Januária, understorey species of deciduous forest on limestone soil, 15°30 S, 44°30 W), 24 Oct 1972 (fl.), J.A. Ratter et al. 2657 (K, NY, UB, UEC). Coronel Murta: s.loc., floresta estacional decidual, 16°31 S, 42°09 W, 269 m) 12 Nov 1981 (fl.), O.A. Salgado 230 (CEPEC,

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Fig. 2. ITS sequence data for Senegalia paganuccii.

TABLE 1. Distinguishing characteristics for Senegalia paganuccii, S. monocantha, S. velutina, and S. tenuifolia.

Characters/Species	Senegalia paganuccii	Senegalia monocantha	Senegalia velutina	Senegalia tenuifolia
Habit	shrub or tree	shrub or tree	liana	tree or liana
Prickles	paired and scattered	1-3 at nodes or scattered	scattered	scattered
Petiole length	6-19 mm	8–32 mm	25-55 mm	8-30 mm

Petiole gland length Petiole gland position Paraphyllidia Pinna pairs/leaf Pinna pair distance Pinna length Leaflet/pinna Leaflet distance Small gland on anther Inflorescence Fruit 0.6–1.5 mm just below pinna-pair present, 0.3–0.7 mm 4–11 pairs 4–10 mm 25–45 mm 25 to 40 pairs 0.7–1.1 mm absent cylindrical spike not articulate

0.9–3.1 mm lower half of petiole absent 2–7 pairs 12–26 mm 45–80 mm 7 to 22 pairs 2–6 mm absent cylindrical spike articulate 1.7-6.1 mm lower third of petiole present, 0.5-1.1 mm 6-14 pairs 7-15 mm 50-100 mm 37-68 pairs 0.8-1.7 mm present cylindrical spike not articulate

1.5–4.2 mm middle of petiole absent 10–25 pairs 3–10 mm 23–62 mm 42 to 80 pairs 0.3–0.9 mm present globose head not articulate

HRB). Manga: Jaiba, estrada Serraria e Mocambinho, 5 Sep 1974, M. Magalhães & M.B. Ferreira 5021 (IPA). PIAUÍ. São Raimundo Nonato: entre São Raimundo Nonato e Anísio de Abreu, caatinga, 17 Nov 1981 (fl.), M.R. Del'Arco & E. Nunes 2214 (IPA, TEPB). Bentham (1842) in his discussion accompanying the description of Acacia velutina DC., first mentioned A.

monacantha Willd. and concluded that if it were a true *Acacieae*, it would belong to this tribe. Under *A. velutina*, Bentham (1842) cited *Blanchet* 2772 from Bahia and *Pohl s.n.* from Brazil, as possibly belonging to this species. However, our studies show that the type of *Acacia velutina* DC. (BRAZIL. RIO DE JANEIRO: [holotype: G, (photos F, MO, SI); isotype: G]), is distinct both from *Blanchet* 2772 ("habitat ad Utinga in deserto fluminis S. Francisco provinciae Bahiensis") and the Pohl collection ("inter Praia et Bom Jardim Provinciae Minas Gerais"). Later, Bentham (1876) considered *Blanchet* 2772 (and another collection, apparently from the same location (*Blanchet* 3772), the Pohl collection and a Lindberg collection ("ad Santos in provinceae São Paulo") to represent *Acacia monacantha* Willd. Additionally, he considered *Acacia velutina* Benth. (1842) to be a synonym of *A. monacantha* Willd. Today these species are regarded as distinct, namely, *Senegalia monacantha* (syn. *Aca-*

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cia monacantha) and Sengalia velutina (syn. Acacia velutina), and the Blanchet and Pohl collections are referred to our new species, S. paganuccii.

The descriptions of Bentham (1875, 1876) and Lewis (1987) for Acacia monacantha and the description and illustrations (p. 201, H1, H2, and H3) of Senegalia monacantha of de Queiroz (2009) all appear to be based on Blanchet 2772 and similar collections and not on the original type material of Acacia monacantha Willd. We therefore consider these treatments referable to S. paganuccii.

Based on morphological similarities and limited analysis of ITS sequences (Fig. 2), Senegalia paganuccii appears to be most closely related to S, tenuifolia (L.) Britton & Rose. The characters used to distinguish Senegalia paganuccii from S. monacantha, S. velutina and S. tenuifolia are summarized in Table 1.

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